

Amendments to the Claims

The following listing of claims replaces all prior versions, and listings, of claims in this application. Applicants propose to amend claims 1, 16 and 30. No new matter is introduced by this amendment.

1. (Currently Amended) An apparatus for use in a system for supercritical processing of an object with a fluid wherein the process includes cleaning and rinsing the object, comprising:
 - means for injecting a processing chemistry into the system for supercritical processing, including means for starting and means for stopping the means for injecting, wherein the means for starting and the means for stopping comprises a flow-control means, wherein the flow-control means comprises at least one of a valve, a pneumatic actuator, an electric actuator, a hydraulic actuator, and a micro-electric actuator; and
 - means for substantially preventing fluid from re-entering the means for injecting during supercritical processing.
2. (Original) The apparatus of claim 1 wherein the means for injecting comprises means for injecting at a predetermined pressure.
3. (Original) The apparatus of claim 2 wherein the predetermined pressure is in a range of approximately 2300 psi to approximately 3000 psi.
4. (Original) The apparatus of claim 2 wherein the means for injecting further comprises at least one of a pump, a first backflow-prevention means for substantially preventing backflow of the processing chemistry, and a second backflow-prevention means for substantially preventing backflow of the processing chemistry.

5. (Original) The apparatus of claim 4 wherein at least one of the first backflow-prevention means and the second backflow-prevention means comprises at least one check valve.
6. (Original) The apparatus of claim 1 wherein at least one of the means for starting and the means for stopping comprises a flow-control means.
7. (Original) The apparatus of claim 6 wherein the flow-control means comprises at least one of a valve, a pneumatic actuator, an electric actuator, a hydraulic actuator, and a micro-electric actuator.
8. (Original) The apparatus of claim 1 wherein the means for substantially preventing fluid from re-entering the means for injecting is operative when at least one of the means for stopping is active and the means for starting is active.
9. (Original) The apparatus of claim 8 wherein the means for substantially preventing fluid from re-entering the means for injecting comprises a back-pressure regulator.
10. (Original) The apparatus of claim 1 wherein the object is a semiconductor wafer for forming integrated circuits.
11. (Original) The apparatus of claim 1 further comprising a fluid source in fluid flow communication with the means for injecting.
12. (Original) The apparatus of claim 1 further comprising a fluid supply means for supplying the processing chemistry to the means for injecting.
13. (Original) The apparatus of claim 12 wherein the processing chemistry is at least one of gaseous, liquid, supercritical and near-supercritical carbon dioxide.

14. (Original) The apparatus of claim 13 wherein at least one of solvents, co-solvents and surfactants are contained in the carbon dioxide.
15. (Original) The apparatus of claim 12 wherein the fluid supply means comprises at least one of a fluid mixer, a first fluid source, a valve for controlling a flow of a first fluid from the first fluid source, a second fluid source, and a valve for controlling a flow of a second fluid from the second fluid source.
16. (Currently Amended) A system for supercritical processing of an object with a fluid wherein the process includes cleaning and rinsing the object, comprising:
 - a high-pressure process chamber;
 - means for injecting a processing chemistry into the high-pressure process chamber including means for starting and means for stopping the means for injecting, wherein the means for starting and the means for stopping comprises a flow-control means, wherein the flow-control means comprises at least one of a valve, a pneumatic actuator, an electric actuator, a hydraulic actuator, and a micro-electric actuator; and
 - means for substantially preventing fluid from re-entering the means for injecting during supercritical processing.
17. (Original) The system of claim 16 wherein the means for injecting comprises means for injecting at a predetermined pressure.
18. (Original) The system of claim 17 wherein the predetermined pressure is in a range of approximately 2300 psi to approximately 3000 psi.
19. (Original) The system of claim 16 wherein the means for injecting includes at least one of a pump, a first backflow-prevention means for substantially preventing backflow of the processing chemistry, and a second backflow-prevention means for substantially

preventing backflow of the processing chemistry.

20. (Original) The system of claim 19 wherein at least one of the first backflow-prevention means and the second backflow-prevention means comprises at least one check valve.
21. (Original) The system of claim 16 wherein at least one of the means for starting and means for stopping comprises a flow-control means.
22. (Original) The system of claim 21 wherein the flow-control means comprises at least one of a valve, a pneumatic actuator, an electric actuator, a hydraulic actuator, and a micro-electric actuator.
23. (Original) The system of claim 16 wherein the means for substantially preventing fluid from re-entering the means for injecting is operative when at least one of the means for stopping is active and the means for starting is active.
24. (Original) The system of claim 23 wherein the means for substantially preventing fluid from re-entering the means for injecting comprises a back-pressure regulator.
25. (Original) The system of claim 16 further comprising means for circulating a fluid, wherein the means for circulating a fluid is coupled to the high-pressure process chamber.
26. (Original) The system of claim 16 further comprising a process control computer coupled for controlling at least one of a valve, a pneumatic actuator, an electric actuator, a hydraulic actuator, a micro-electric actuator, a pump, and a back-pressure regulator.
27. (Original) The system of claim 16 wherein the object is a semiconductor wafer for forming integrated circuits.

28. (Original) The system of claim 16 wherein the processing chemistry is at least one of gaseous, liquid, supercritical and near-supercritical carbon dioxide.
29. (Original) The system of claim 28 wherein at least one of solvents, co-solvents and surfactants are contained in the carbon dioxide.
30. (Currently Amended) A supercritical processing system for processing a semiconductor wafer with a fluid, the fluid being from a fluid source wherein the process includes cleaning and rinsing the object, the system comprising:
 - a. a circulation loop coupled to a high-pressure processing chamber; and
 - b. an inlet line for introducing the fluid into the circulation loop, the inlet line including:
 - i. an inlet port in the circulation loop;
 - ii. a back-pressure regulator coupled to the inlet port;
 - iii. a pump for compressing the fluid to form a pressurized fluid;
 - iv. a first line for transferring the pressurized fluid from the pump to the back-pressure regulator, the first line configured to maintain a uni-directional flow of the pressurized fluid from the pump towards the back-pressure regulator; and
 - v. a second line for transferring a quantity of the fluid from the fluid source to the pump, the second line configured to maintain a uni-directional flow of the fluid from the fluid source to the pump.

31. (Withdrawn) A method of regulating a flow of a processing chemistry into a system for supercritical processing of an object with a fluid, comprising the steps of:
- a. supplying the processing chemistry to a pump for compressing the processing chemistry to form a pressurized fluid;
 - b. providing a start-stop system for controlling an inlet line for introducing the processing chemistry into the system, such that when a start mode is active the pressurized fluid is introduced into the system, and such that when a stop mode is active the pressurized fluid is not introduced into the system;
 - c. maintaining a flow of the pressurized fluid when the start mode is active; and
 - d. preventing a fluid within the system from entering the inlet line while at least one of the start mode and the stop mode is active.
32. (Withdrawn) The method of claim 31 wherein the step of maintaining a flow of the pressurized fluid comprises operating the pump such that a predetermined quantity of the processing chemistry is introduced into the system.
33. (Withdrawn) The method of claim 32 wherein the predetermined quantity of the processing chemistry is introduced into the system at a predetermined pressure.
34. (Withdrawn) The method of claim 33 wherein the predetermined pressure is in a range of approximately 2300 psi to approximately 3000 psi.
35. (Withdrawn) The method of claim 31 wherein the step of preventing a fluid within the system from entering the inlet line comprises providing a back-pressure regulator.
36. (Withdrawn) The method of claim 31 wherein the object is a semiconductor wafer for forming integrated circuits.

37. (Withdrawn) The method claim 31 wherein the processing chemistry is at least one of gaseous, liquid, supercritical and near-supercritical carbon dioxide.
38. (Withdrawn) The method claim 33 wherein at least one of solvents, co-solvents and surfactants are contained in the carbon dioxide.
39. (Withdrawn) The method claim 31 further comprising performing at least one of a supercritical cleaning process and a supercritical rinsing process.